

IN THE SPECIFICATION:

Please replace paragraph [0006] with the following amended paragraph:

21 [0006] To attach and electrically connect the conductive balls 41 of the BGA package 10 to a substrate – such as, for example, an MCM carrier substrate or a burn-in board – the substrate is configured with a plurality of contact pads arranged in a number of contact pad arrays. Each contact pad array includes a number of contact pads arranged in a pattern corresponding to the pinout of the BGA package 10. The conductive balls 41 of the BGA package 10 may be formed of solder or a conductive or conductor-filled epoxy. If solder, the conductive balls 41 are reflowed to connect to the contact pads of the contact pad array on the substrate. If epoxy, the conductive balls 41 may be first heated to a tacky “B” stage to adhere to the contact pads, and then further heated to completely cure the epoxy to a “C” stage. A substrate may include a plurality of IC devices mounted thereto, wherein each of the IC devices is permanently attached to a corresponding contact pad array on a surface of the substrate. By way of example, an MCM may be a memory module comprised of a one-piece carrier substrate having opposing substantially planar surfaces, with one or both of the opposing surfaces of the carrier substrates including multiple contact pad arrays and a plurality of IC devices, such as BGA and SOJ packages, mounted thereto.

Please replace paragraph [0038] with the following amended paragraph:

21 Referring to FIGS. 3 and 4, a one-piece substrate 160 includes a plurality of spring contacts 120 disposed thereon and arranged in rows and columns to form a two-dimensional array 121 of spring contacts 120 corresponding to the footprint of a BGA package, such as the conventional BGA package 10 (shown in FIGS. 3 and 4 in dashed line). Each spring contact 120 is disposed in a mating aperture 170 formed in the substrate 160, and the substrate 160 includes a plurality of such apertures 170 arranged in an array 171 corresponding to the two dimensional array 121 of spring contacts 120 to be disposed therein, respectively.

Please replace paragraph [0044] with the following amended paragraph:

203 [0044] Each aperture 170 in substrate 160 may include a seat portion 172 and a retaining portion 174. The seat portion 172 is configured to receive the contact portion 122 of a spring contact 120. The seat portion 172 generally comprises a recess formed in one substantially planar surface 167 of the substrate 160. The retaining portion 174 is configured to receive and retain the base portion 124 of the spring contact 120 and to establish electrical contact with the spring contact 120. The retaining portion 174 generally comprises a via extending from the seat portion 172 through the substrate 160 and opening to a second opposing substantially planar surface 168 of the substrate 160.

Please replace paragraph [0065] with the following amended paragraph:

204 [0065] Referring to FIG. 15, an MCM 1000 incorporating a plurality of spring contacts 1020 according to the present invention is shown. The MCM 1000 includes a one-piece carrier substrate 1060 having one or more BGA packages 10a mounted to a substantially planar surface 1067 thereof and having one or more BGA packages 10b mounted to an opposing substantially planar surface 1068 thereof. Although IC devices are shown mounted to both surfaces 1067, 1068 of the carrier substrate 1060, those of ordinary skill in the art will understand that the MCM 1000 may have IC devices mounted to only one of its carrier substrate surfaces 1067, 1068. The BGA packages 10a, 10b are secured to the carrier substrate 1060 by clamping elements 90, which are shown as stab-in-place clips in FIG. 15. In addition, U.S. patent application Serial No. 09/478,619, the disclosure of which has been previously incorporated herein by reference, discloses and claims apparatus especially suitable for nonpermanently connecting integrated circuit devices such as BGA packages 10a, 10b to MCM substrates such as carrier substrate 1060.
